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12

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/624,203	07/21/2003	Paul A. Grudowski	SC12430TP	7732

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LALLY & LALLY LLP
PO BOX 684749
AUSTIN, TX 78768-4749

EXAMINER

TOLEDO, FERNANDO L

ART UNIT PAPER NUMBER

2823

DATE MAILED: 06/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

my

Office Action Summary	Application No.	Applicant(s)	
	10/624,203	GRUDOWSKI, PAUL A.	
	Examiner	Art Unit	
	Fernando L. Toledo	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 17-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3 and 10-12 is/are rejected.
- 7) ☒ Claim(s) 2,4-9 and 13-16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Claims 17 – 20 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 6 April 2004.
2. Applicant's election without traverse of claims 1 – 16 in the reply filed on 6 April 2004 is acknowledged.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Aronowitz et al. (U. S. patent 6,331,468 B1).

In re claim 1, Aronowitz in the U. S. patent 6,331,468 B1; figures 1 – 30 and related text, discloses forming a gate electrode 12 over a gate dielectric (6/10) over a semiconductor substrate 2; depositing a spacer film 16 over the gate electrode, the deposited spacer film exhibiting a first tensile stress; modulating a stress characteristic of at least a portion of the spacer film from the first tensile stress to a second tensile stress (Figure 7); and etching the spacer film to form

Art Unit: 2823

sidewall spacers laterally disposed on either side of the gate electrode, wherein at least a portion of the sidewall spacers include sidewall spacers exhibiting the second tensile stress (Figure 8).

5. In re claim 3, Aronowitz discloses wherein modulating the stress characteristic includes implanting a species into at least a portion of the spacer film (Figure 7).

6. Claims 10 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Kluth et al. (U. S. patent 6,602,754 B1).

In re claim 10, Kluth, in the U. S. patent 6,602,754 B1; figures 1 – 5 and related text, discloses depositing a silicon nitride spacer film 23 over a gate electrode 21 and a semiconductor substrate 20 over which the gate electrode is positioned; etching the spacer film to form silicon nitride spacers on sidewalls of the gate electrode (Figure 2); and implanting at least some of the sidewall spacers with an implant species to modulate a stress characteristic of the implanted spacers (Figure 2).

7. In re claim 11, Kluth discloses wherein depositing silicon nitride further includes depositing silicon nitride exhibiting a first tensile stress characteristic (Figure 2).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kluth as applied to claims 10 and 11 above, and further in view of Wolf and Tauber (Silicon Processing for the VLSI Era Volume 1: Process Technology).

Kluth discloses wherein depositing silicon nitride still further includes depositing silicon nitride with a thermal CVD process in (Column 3, Lines 53 – 60).

Kluth does not show wherein the silicon nitride is deposited at approximately 550 to 750°C. However, Wolf, in the textbook Silicon Processing for the VLSI Era Volume 1: Process Technology, discloses that silicon nitride is conventionally deposited at temperatures between 700 to 800°C for reasons of uniformity and lower processing costs (page 192).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to deposit the silicon nitride of Kluth at a temperature of 700 – 800°C, since, as taught by Wolf, silicon nitride is conventionally deposited at temperatures between 700 to 800°C for reasons of uniformity and lower processing costs.

Claim Objections

10. Claims 2, 4 – 9 and 13 – 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Allowable Subject Matter

11. The following is a statement of reasons for the indication of allowable subject matter:

Art Unit: 2823

a. With regards to claim 2, Aronowitz does not teach, suggest or disclose forming a silicon nitride layer as the spacer layer. The invention of Aronowitz discloses forming a polysilicon layer or an amorphous silicon layer and then implanting nitrogen to form the silicon nitride layer. Substituting the polysilicon layer or amorphous silicon layer in the invention of Aronowitz would effectively teach away from the claimed invention, since then there will be no apparent reason to implant the nitrogen into the spacer layer. Kluth on the other hand discloses forming a silicon nitride layer, patterning the layer and then implanting a species into the spacer film. There would be no motivation to form the layer, implant and then form the spacers, since the reason for the ion implantation in the invention of Kluth is to protect the layer from forming a silicide layer.

b. With regards to claims 4 – 9 and 13 – 16 neither Aronowitz nor Kluth teach, disclose or suggest implanting xenon or germanium into the silicon nitride layer. There is no motivation aside from improper hindsight to make obvious those limitations.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando L. Toledo whose telephone number is 571-272-1867. The examiner can normally be reached on Mon-Thu 7am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2823

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



FT Toledo

11 June 2004



Olik Chaudhuri
Supervisory Primary Examiner
Art Unit 2823